

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Hiroshi SHIMANUKI *et al.*

Group Art Unit:

Serial No.: **Not Yet Assigned**

Examiner:

Filed: **Herewith**

For: **FUEL CELL SYSTEM AND
HUMIDIFICATION METHOD**

Attorney Docket No.: **IIW-014**

BOX PATENT APPLICATION

Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Dear Sir:

Preliminary to examination of the above-referenced patent application, please amend the application as follows.

In the Claims:

Please amend claims 1, 5, 7-11 as follows:

1. (Amended) A fuel cell system, which has a fuel cell that generates electrical power by the electrochemical reaction between a fuel gas supplied to an anode and an oxidant gas supplied to a cathode, and a humidifying apparatus that humidifies the gases with water permeable membranes, comprising:

a first humidifier, which is provided in said humidifying apparatus; and

non-porous water permeable membranes, which are provided in said first humidifier to humidify said fuel gas supplied to said anode by means of the moisture contained in off-gas discharged from said fuel cell.

5. (Amended) The fuel cell system according to claim 1, wherein said off-gas is discharged from the cathode.

7. (Amended) The fuel cell system according to claim 1, wherein said non-porous water permeable membranes transport water by ion hydration.

8. (Amended) The fuel cell system according to claim 5, wherein said non-porous water permeable membranes transport water by ion hydration.

9. (Amended) The fuel cell system according to claim 2, wherein said porous water permeable membranes transport water by capillary condensation.

10. (Amended) A fuel cell system, which has a fuel cell that generates electrical power by the electrochemical reaction between a fuel gas supplied to the anode and an oxidant gas supplied to the cathode, and a humidifying apparatus that humidifies the gases with water permeable membranes, comprising:

a first humidifier, which is provided in said humidifying apparatus and humidifies said fuel gas supplied to said anode by means of the moisture contained in off-gas discharged from said fuel cell; and

a second humidifier, which is provided in said humidifying apparatus and humidifies said oxidant gas supplied to said cathode by the off-gas passing through said first humidifier.

11. (Amended) A method of humidifying fuel and oxidant gases supplied to a fuel cell in a humidifying apparatus, comprising:

introducing a moisture containing off-gas discharged from said fuel cell into said humidifying apparatus;

introducing moisture into said fuel gas from said off-gas through water permeable membranes in said humidifying apparatus;

introducing moisture into said oxidant gas from said off-gas through water permeable membranes in said humidifying apparatus; and

supplying said fuel and oxidant gases to said fuel cell.

Please cancel claim 6 and add new claim 12 as follows:

12. (New) A method of humidifying fuel and oxidant gases supplied to a fuel cell in a humidifying apparatus, comprising:

introducing moisture containing off-gas discharged from said fuel cell into said humidifying apparatus;

introducing moisture into said fuel gas from said off-gas through non-porous water permeable membranes in said humidifying apparatus;

introducing moisture into said oxidant gas from said off-gas through water permeable membranes in said humidifying apparatus; and

supplying said fuel and oxidant gases to said fuel cell.

REMARKS

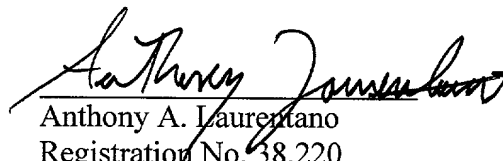
Preliminary to examination of this application, please amend claims 1, 5, and 7-11, cancel claim 6 and add new claim 12 as set forth above. These amendments attend to minor formal matters by removing multiple dependencies, and addressing other minor matters of form. The foregoing amendments are not related to issues of patentability. Support for the amendment to the claim can be found throughout the specification, Figures and claims as originally filed.

Applicants respectfully submit that the foregoing amendments introduce no new matter. Entry of the foregoing Preliminary Amendment is in order and requested.

If there are any questions regarding the proposed amendments to the application, we invite the Examiner to call Applicants' representative at the telephone number below.

Respectfully submitted,

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Date: January 22, 2002

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Please amend claims 1, 5, and 7-11 as follows:

1. (Amended) A fuel cell system, which has a fuel cell that generates electrical power by the electrochemical reaction between ~~the~~a fuel gas supplied to ~~the~~an anode and ~~the~~an oxidant gas supplied to ~~the~~a cathode, and a humidifying apparatus that humidifies the gases with water permeable membranes, comprising:

a first humidifier, which is provided in said humidifying apparatus; and

non-porous water permeable membranes, which are provided in said first humidifier ~~and to~~humidify said fuel gas supplied to said anode by means of the moisture contained in off-gas discharged from said fuel cell.

5. (Amended) The fuel cell system according to ~~claims 1 through 4~~claim 1, wherein;

_____ said off-gas is discharged from the cathode.

7. (Amended) ~~The humidifying apparatus according to claims 1 through 4 and claim 6~~fuel cell system according to claim 1, wherein; _____ said non-porous water permeable membranes transport water by ion hydration.

8. (Amended) ~~The humidifying apparatus~~fuel cell system according to claim 5, wherein;

_____ said non-porous water permeable membranes transport water by ion hydration.

9. (Amended) The fuel cell system according to ~~claims 2 through 4~~ claim 2, wherein:

said porous water permeable membranes transport water by capillary condensation.

10. (Amended) A fuel cell system, which has a fuel cell that generates electrical power by the electrochemical reaction between ~~the~~ a fuel gas supplied to the anode and ~~the~~ an oxidant gas supplied to the cathode, and a humidifying apparatus that humidifies the gases with water permeable membranes, comprising:

a first humidifier, which is provided in said humidifying apparatus and humidifies said fuel gas supplied to said anode by means of the moisture contained in off-gas discharged from said fuel cell; and

a second humidifier, which is provided in said humidifying apparatus and humidifies said oxidant gas supplied to said cathode by ~~means of the off-gas having passed~~ passing through said first humidifier.

11. (Amended) A method of humidifying ~~the~~ fuel and oxidant gases supplied to a fuel cell in a humidifying apparatus, comprising:

~~introduction of the~~ introducing a moisture ~~contained~~ containing off-gas discharged from said fuel cell into said humidifying apparatus;

~~moisture reception of~~ introducing moisture into said fuel gas from said off-gas through water permeable membranes in said humidifying apparatus;

~~moisture reception of~~ introducing moisture into said oxidant gas from said off-gas through water permeable membranes in said humidifying apparatus; and

~~supply~~ supplying said ~~of respective said humidified~~ fuel and oxidant gases to said fuel cell.

Please cancel claim 6 and add new claim 12.